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Magyar-Szovjet Kozgazdasagi Szemle, Vol V, No 4-5, 1951.THE RUMANIAN ELECTRIFICATION PLAN

Lack of adequate electric power has long been a serious impediment in the industrialization of Rumania. Industrialization planned under the first Rumanian Five-Year Plan (1951 - 1955) will be carried out in close conjunction with an active program designed to expand considerably the electric power system.

At present, the total capacity of Rumania's power plants is 740,000 kilowatts. However, due to operational disturbances and obsolete equipment, only 600,000 kilowatts can be exploited. Power is generated in 603 plants, with an average capacity of barely 1,230 kilowatts per plant. Each plant supplies from 0.5 to 6.8 kilowatts per square kilometer of the area which it serves. Expressed in terms of population, the average is 7-71 watts per capita. Electrification of towns, especially of villages, has been sadly neglected. Only 28.7 percent of the country's total population live in electrified localities, and only 450 villages out of a total of 13,000 have been electrified so far.

On the basis of fuel supply, the picture of total electric power production for 1950 may be broken down as follows:

Source	Percent (approx)
Natural gas	40.3
Petroleum products	29.8
High-grade coal	6.1
Coal waste and low-grade coal	13.7
Other fuel	2.1
Water power	8.0
Total	100

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At present, Rumania's high-tension grid is only 2,514 kilometers long.

According to recent estimates, Rumania's waterways represent 5,650,000 kilowatts of potential power and can produce 27.2 billion kilowatt-hours in a normal year. The Danube, especially at the Iron Gate, has a capacity of 1,280,000 kilowatts, which, with average precipitation, could assure production of 8.8 billion kilowatt-hours a year. The lower stretch of the Danube, from the Iron Gate to the sea, has not yet been studied in regard to power production. However, the electrification of the country cannot be based on hydroelectric plants exclusively, because production by hydroelectric plants is greatly influenced, especially in drought years, by irrigation and navigation.

Present yearly lignite consumption for the production of electric power is 150,000 tons. Research has shown that vast lignite beds are located at Doicești-Sotanga, Filipești de Pășure, Capleni, Sarmasag, Carbonești (Oltenia), and in the Timis Valley (Banat). Within 10 years, lignite consumption can be raised to 3.2 million tons a year, which equals a production potential of 2.3 billion kilowatt-hours annually.

River regulation, flood control, navigation, irrigation, afforestation, and pisciculture all have to be considered when dealing with the country's electrification, since they are closely interrelated. A large portion (2.7 million hectares) of Rumania's arable land is subject to recurring droughts, and, at present, only 50,000 hectares are under irrigation. By properly utilizing the rivers and reservoirs, 1.2 million hectares could be placed under irrigation within 10 years, which would increase the annual crop by 240,000 carloads of grain.

One of Rumania's most valuable natural resources, the Danube, has not yet been properly exploited. Navigation is still difficult. The river bed is not deep enough for larger vessels, passage at the Iron Gate, especially in times of drought, is dangerous, and free passage to the sea is obstructed by the Sulina dam. The projected hydroelectric plants with their dams will regulate the water level and thus facilitate navigation. The Danube-Black Sea Canal, now under construction, will assure free passage to the sea.

According to the latest estimates, a carefully planned system of dams will make 540,000 hectares of the Danube's flood area available for agriculture and pisciculture. The land to be regained is of very good quality, and irrigation will be easily available due to the proximity of the Danube. These factors, in addition to the mild climate and the future electrification of the area, will permit the cultivation of industrial plants, such as cotton and rice, and also horticulture. In connection with the projected Danube regulation, large areas will be made available for fish ponds. Swamp drainage and the regular flow of fresh water in the fish ponds will greatly reduce malaria and generally improve the health of the population of the Danube region.

The Ten-Year Electrification Plan, which was published in 1950, forms an integral part of Rumania's first two Five-Year Plans and is based on the organized utilization of the country's water power and low-grade fuels. By building new power plants and enlarging some of the existing ones, capacity will be raised by 2 million kilowatts. The following breakdown shows the projected work in more detail: construction of 13 large thermal power plants with a combined capacity of 1,039,000 kilowatts; increase in the combined capacity of five thermal power plants by 59,000 kilowatts; construction of thermal plants with 98,000-kilowatt capacity at industrial plants; construction of 24 hydroelectric power plants with combined capacity of 764,000 kilowatts; and construction of several smaller power plants with combined capacity of 40,000 kilowatts.

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Thus, the combined capacity of thermal power plants will be raised by 1,196,000 kilowatts and the combined capacity of hydroelectric power plants will be raised by 764,000 kilowatts, which, together with the output of the smaller power plants, will increase the total capacity by 2 million kilowatts.

#### Estimated Results of the Ten-Year Electrification Plan

	<u>1950</u>	<u>1955</u>	<u>1960</u>
Total theoretical capacity (1,000 kw)	740	1,700	2,600
Total practical capacity (1,000 kw)	600	1,660	2,500
Breakdown of practical capacity			
Thermal power (1,000 kw)	550 (92%)	1,370 (82.5%)	1,665 (66.6%)
Water Power (1,000 kw)	50 (8%)	290 (17.5%)	835 (33.4%)
Electric power per square kilo- meter (kw)	2.53	7.0	10.6
Electric power per inhabitant (w)	37.5	105	150

By 1960, hydroelectric power plants will produce 33.4 percent of the country's electric power instead of the present 8 percent. Among the thermal power plants, those utilizing low-grade fuels will produce 985,000 kilowatts in 1960, which will equal 59 percent of the capacity of all thermal power plants. In the course of the Ten-Year Plan, consumption of petroleum products will drop to 120,000 tons (less than half of the present requirements), and consumption of natural gas will be reduced to 420 million cubic meters annually.

#### Distribution of Energy by Users

	<u>1950</u>	<u>1960</u>
	(Million kw)	
Industry and mining	1,310	4,330
Electric trains	2	300
Municipal services		
Street lighting	70	200
Public conveyances	80	200
Water supply, etc.	40	120
Consumption in households, offices, and stores	220	750
Rural consumption	20	230
Losses incurred during transmission and distribu- tion; power plant requirements	358	870
Total	2,100	7,000

The projected and existing power plants will be divided into the following seven power systems:

1. Muntenia
2. Oltenia
3. Northern Moldova
4. Southern Moldova (including the Dobruja)

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5. Central Transylvania
6. Northwestern Transylvania
7. Southwestern Transylvania

The individual power plants will be connected by high-tension grids, which will be used for transmission of current. The plan provides for the laying of 3,960 kilometers of transmission lines and for construction of necessary transformers.

During the first Five-Year Plan, capacity will be increased by approximately one million kilowatts, which represents a 267-percent increase over present capacity. Approximately 230,000 kilowatts of this increase are to be supplied by hydroelectric plants and 660,000 kilowatts by thermal power plants.

Under the first Five-Year Plan, 146 billion lei, on the basis of 1950 prices, will be invested in electrification. Sale of current will amortize this amount within 18½ years from the date the plants start to operate. The present average price of 5.30 lei per kilowatt-hour will be reduced to 2.50 lei for electricity generated in hydroelectric plants and to 3.50 lei for electricity generated in thermal power plants.

The first Five-Year Plan provides for the construction of the following large plants: the Vladimir Ilyich Lenin Hydroelectric Plant at Stejaru on the Bistrita River, the Moroien and Scropoasa hydroelectric plants on the Ialomita River, the Rau-de-Mori hydroelectric plant in the Jiul Valley, the Remetia plant in the Dragan Valley, the Guren and Sadu hydroelectric plants, and also plants at Doicesti, Filipesti de Padure, Petrosani, and Valisoara in the Jiul Valley, and at Sargiorgiu, Comanesti, and Ovidiu.

Among these, the plant now under construction at Stejaru on the Bistrita will be the largest, with a capacity of 210,000 kilowatts and a yearly energy production of 430 million kilowatt-hours. To regulate the water level of the Bistrita, a large dam and a reservoir with a capacity of 1,200 million cubic meters are being built in the vicinity of Bicaz. The reservoir, in addition to dams planned for the future, will raise the capacity of the Bicaz region power plants to at least 450,000 kilowatts and their production to one billion kilowatt-hours in normal years.

The dam and reservoir now under construction near Bicaz will also be utilized in an irrigation project planned for a 300,000-hectare area in northern Moldova and Baraganu. In conjunction with this project, the section of the Siretul River between Galati and Barau will be regulated for navigation.

The Stejar plant is scheduled for completion in 1955. It will supply current to the industrial enterprises being built in Moldova under the first Five-Year Plan and also to the Moldavian towns and villages. Transmission grids of 220,000 and 110,000-volt tension will connect the plant with Transylvania, Muntenia, and Moldova.

It is planned to start operation of the 15,000-kilowatt Moroien hydroelectric plant as early as 1952. On the other hand, the 8,000-kilowatt Scropoasa hydroelectric plant will be completed only in 1957. Completion of the 15-million-cubic-meter reservoir, now being constructed near Bolboci, is planned in the same year. The reservoir will also be used for the regulation of the Ialomita and for irrigation of a 20,000-hectare area.

Construction of the Doicesti thermal power plant has been started. The plant will be fueled by lignite mined on the spot. Total capacity of the plant will be 120,000 kilowatts. Of this, 60,000 kilowatts will be put in operation by the end of 1952. Completion is scheduled for 1955. At that time, the plant's production will be 300 million kilowatt-hours per year.

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The thermal power plant under construction at Filipești de Padure will also be fueled by lignite mined on the spot. Approximately 50,000 kilowatts will be available by the end of 1953, and the capacity will be gradually increased until the total of 150,000 kilowatts is reached in 1956. In 1955, the plant's production will be 300 million kilowatt-hours; after completion, it will be 500 million kilowatt-hours per year.

The Doicești and Filipești de Padure plants will supply Bucharest and the oil wells and refineries in Prahova, Dambovită, and Stalin provinces, as well as the Orasul Stalin-Campina railroad, which is to be electrified under the first Five-Year Plan.

The Petrosani thermal power plant in the Jiu Valley is scheduled for completion at the end of the first Five-Year Plan. Refuse of the washed coal for the Vajdahunyad coking plant and low-grade coals will be used as fuel. The capacity of the plant is planned at 150,000 kilowatts and its yearly production at 675 million kilowatt-hours. The Petrosani plant, together with the Valisoara thermal plant and the Rap-de-Morți hydroelectric plant, which are now under construction, will supply current to the Jiu Valley coal mines, the Vajdahunyad and Resita metallurgical combines, the Voros Acel (Red Steel) enterprise, and also to southwestern Banat and southwestern Transylvania.

A large amount of electricity is needed for the new industrial enterprises to be completed within the near future, and also to enable existing enterprises to step up their production. To procure this urgently needed current, many existing thermal plants, mostly using natural gas, will be enlarged during 1950 - 1952.

Special attention is given to the electrification of villages. Current will be supplied to the villages through the high-tension transmission lines of the large thermal power plants and by smaller local power plants.

The first Five-Year Plan envisages the electrification of 2,000 villages. At first, current will be delivered only to machine-tractor stations and to state and cooperative farms. In towns not reached by the high-tension transmission lines, small local plants will be erected. These plants, mostly hydroelectric, will have a capacity of 500 kilowatts each and will supply one or more villages, as well as local industry and irrigation projects. It is also planned to install generators in existing water mills and to utilize the mills for power production.

Part of the machinery and equipment needed for the completion of the electrification plan will be imported, although it is planned to manufacture the largest part in the country. The USSR will aid Romania by giving technical help and shipping machinery to factories which will produce the electrical equipment.

In 1951, production of steam and water turbines, transformers, high- and low-tension switches, and 50-2,000-kilowatt electric motors and generators was started in the new factories. During the first Five-Year Plan an electrochemical insulating-material plant will be constructed, and manufacture of cables and of insulated and noninsulated transmission lines will be increased. It is also planned to expand the existing electrotechnical and machine-producing plants. Manufacture of synchronized and micromotors, machines using direct current, generators, precision instruments, automatic telephones, and hydroelectric plant equipment is to be stepped up. An intensive training program for electrotechnicians and electrical engineers is also under way.

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